N° 5387 A.D. 1900

Date of Application, 21st Mar., 1900

Complete Specification Left, 21st Jan., 1901—Accepted, 21st June, 1901

PROVISIONAL SPECIFICATION.

"Improvements in Apparatus for Wireless Telegraphy."

I, Guglielmo Marconi, of The Wireless Telegraph and Signal Company Limited, of No. 28 Mark Lane, in the County of London, Electrician, do hereby declare the nature of this invention to be as follows:—

My invention relates to improvements in apparatus for conducting so-called wireless telegraphy in accordance with principles already described and patented by me, whereby I not only increase the efficiency of the methods I have already described, but am enabled to localise the action and so direct intelligible communications to one out of several receiving stations. In my former Specifications Nos. 12039 of 1896, 29306 of 1897, 12325 of 1898 and 12326 of 1898 I have described the means that I employ for communicating between two stations situated at a great distance and between which obstacles may intervene.

I employ in one of my methods as transmitter an induction coil, one terminal of the secondary circuit being attached to a metal sphere connected to the earth and the other to an insulated conductor, which generally takes the form of a more or less vertical insulated wire which may or may not terminate or have attached to it a metal body of extended surface giving it increased electrical capacity.

At the receiving station I have generally employed a similar insulated conductor between the lower end of which and the earth the sensitive receiving apparatus is interposed. I have, however, discovered modes of constructing the conductors in pairs which greatly increases their efficiency. In one method according to my present invention the conductors at each station consist of a high approximately vertical metallic wire, or cable, or metal rod, or tube, which is surrounded by a dielectric covering of indiarubber, gutapercha, impregnated paper or any other insulator of considerable dielectric strength, such for instance as air.

Outside this insulator is placed a metal tube or stranded wire sheath so that the two conductors form a concentric cable, the outer conductor being well insulated from the inner. The outer conductor may be a metallic spiral band or wire, or even a metal foil covering, and for protection may be covered over with an insulating protective covering.

Instead of employing two conductors in the form above described, there may be two wires, rods or strips, insulated from each other, but in any case the two conductors should be of considerable length.

At the transmitting station I erect one of these double conductors, and at the receiving station, or stations a similar one. At the transmitting station I connect one of the conductors to one terminal of an induction coil capable of giving powerful electric sparks, and I connect that terminal also to earth. The other terminal of the induction coil is connected to the other conductor, which is insulated. In series either with the one or the other of the two conductors I place an inductance coil of variable inductance.

When the two conductors are in concentric form, the inner one is connected to earth.

At the receiving end I provide a similar inductance coil in series with either of the two conductors with a similar earth connection of one of them, and I

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connect any suitable form of sensitive tube, coherer, or other Hertz wave receiving device in between the two conductors and the associated inductance coil.

I also add to the receiving device a telegraphic relay and receiving or printing instrument for receiving and recording intelligible messages in accordance with arrangements described by me in my previous specifications. I may also insert between the sensitive receiving device and the terminations of the pair of conductors an induction coil or transformer of a kind suitable for the transformation of very rapidly alternating electric currents.

In employing my invention to localise the transmission of intelligence to one out of several receiving stations in contiguity, I proceed as follows:—

At the transmitting end I employ an inductance coil of which the self induction can be varied over wide limits At each of the receiving stations I associate with one of the conductors an inductance coil of fixed inductance suitably selected. I find that if the inductance coil at the transmitting station has its inductance varied until the electrical system composed of the pair of conductors and its associated inductive coil is in resonance with that of one of the receiving systems, that one alone, out of all the number of receiving stations responds, provided that the distance between the transmitter and receiver is not too small.

In this manner, by a suitable process of trial and failure I can adjust each receiving instrument to respond only to the transmitter when the inductance of that transmitter has a certain value or values.

One essential part of my invention is the employment of a concentric cable or insulated concentric conductor, or two closely adjacent parallel insulated wires, which combine with electrical capacity length great in proportion to diameter or width.

I find it is essential for success in long distance wireless telegraphy as conducted by my methods, that the conductors shall have a considerable length in proportion to their width or diameter, that both stations should have earth connections as described, and not merely that the receiver and transmitter shall possess what is commonly called electrical tuning.

Dated this 21st day of March 1900.

ABEL & IMRAY
Agents for the Applicant.

COMPLETE SPECIFICATION.

"Improvements in Apparatus for Wireless Telegraphy."

I, Guglielmo Marconi, of The Wireless Telegraph and Signal Company Limited, of No. 28 Mark Lane, in the County of London, Electrician, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

My invention relates to improvements in apparatus for wireless telegraphy in accordance with principles already described and patented by me, whereby I increase the efficiency of the methods I have already described, and am enabled to localise the action and so direct intelligible communications to one out of a group of several receiving stations.

In my former Specifications Nos. 12039 of 1896, 29306 of 1897, 12325 of 1898 and 12326 of 1898, I have described the means that I employ for communicating between two stations situated at a great distance, and between which obstacles may intervene.

I employ in one of my methods as transmitter, an induction coil or transformer, one terminal of the secondary circuit being attached to a metal sphere connected to the earth and the other to an insulated conductor, which generally takes the form of a more or less vertical wire, which may or may not terminate, or have attached to it a metal body of extended surface giving it increased electrical capacity.

At the receiving station I have generally employed a similar conductor, between the lower end of which and the earth the receiving apparatus is interposed. I have however discovered modes of constructing the conductors in pairs, which greatly increases their efficiency. In one method according to my present invention the conductors at each station consist of a high approximately vertical conductor, which may be a cable, metal rod or tube, which is surrounded by a dielectric covering of indiarubber, guttapercha or air.

Outside this insulator is placed a metal tube or stranded wire sheath so that the two conductors form a concentric cable, the outer conductor being insulated from the inner. The outer conductor may be a spiral band or wire, or even a metal foil covering.

Instead of employing two conductors in the form above described there may be two wires, rods or strips, insulated from each other.

At the transmitting station I erect one of these double conductors, and at the receiving station a similar one or several of these. At the transmitting station I connect one of the conductors to one terminal of an induction coil capable of giving electric sparks, and I connect that terminal also to earth. The other terminal of the induction coil is connected to the other conductor which is insulated

In series, either with the one or the other of the two conductors, I place an inductance coil and variable inductance. When the two conductors are in concentric form, the inner one is connected to earth.

At the receiving end I provide a similar inductance coil in series with either of the two conductors, with a similar earth connection to one of them, and I connect a suitable form of sensitive tube, coherer, or other Hertz wave receiving device in between the two conductors and the associated inductance coil.

I also add to the receiving device a telegraphic relay and receiving or printing instrument, for receiving and recording messages in accordance with arrangements described by me in my previous specifications. I usually also insert between the sensitive receiving device and the termination of the pair of conductors, an induction coil or transformer of a kind suitable for the transformation of very rapidly alternating currents, such as are described in my Specifications Nos. 12326 of 1898, 6982 of 1899 and 25186 of 1899.

In employing my invention to localise the transmission of intelligence to one out of several receiving stations in contiguity, I proceed as follows:—

At the transmitting end the inductance coil which I employ is such that its self induction can be varied over wide limits. At each of the receiving stations I associate with one of the conductors an inductance coil of fixed inductance suitably selected. I find that if the inductance coil at the transmitting station has its inductance varied until the electrical system composed of the pair of conductors and its associated inductance coil is in resonance with that of one of the receiving systems, that one alone, of all the receiving systems responds, provided that the distance between the transmitter and receiver is not too small.

In this manner by systematic trials, I can adjust each receiving instrument to respond to the transmitter when the inductance of that transmitter has a certain value.

Figs. 1 and 2 are diagrams of transmitting and receiving apparatus, arranged as above described. T indicates the transmitting system, and R the receiving. In Fig. 1, *a b* indicate concentric metal cylinders. I have used with success outer cylinders 3 feet in diameter and inner cylinders 1 foot 6 inches in diameter, both 20 feet high. For higher cylinders it is desirable to increase the annular space between the outer and inner cylinders. *g* indicates the spark gap of an induction coil or transformer *c* which is connected to the cylinders *b* and *a*, an inductance coil *i* being interposed. *s* is the battery and *k* the key. A Tesla coil may be used to produce the oscillations.

In R an induction coil or transformer *c* similar to those described in my previous specifications, is used, and is inserted between the two concentric cylinders *b a*, along with an inductance coil i^1. The induction coil or transformer *c* is connected to a coherer or detector *d* of electric waves, and a suitable receiver such, for example, as is described in my Specification No: 12039 of 1896, the connections and other details being, for clearness, omitted.

The internal cylinders *b* are connected to earth *e* or to a large capacity which may be used in place of earth.

The inductances of *i* and i^1 are so adjusted as to cause the two systems of transmitter and receiver to be in tune.

Fig. 2 shews a modification in which two adjacent conductors *a* and *b* are used instead of the concentric cylinders, the connections being the same as in Fig. 1.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. In transmitting and receiving apparatus for wireless telegraphy, the combination of two conductors and an inductance coil, one of the conductors in each apparatus being connected to earth, substantially as described.

2. Employing as the two conductors a pair of concentric metallic cylinders insulated from each other substantially as described.

3. Apparatus for wireless telegraphy arranged substantially as described and illustrated in the accompanying drawings.

Dated this 21st day of January 1901.

ABEL & IMRAY
Agents for the Applicant.

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MARCONI'S COMPLETE SPECIFICATION.

(1 SHEET)

Fig. 1.

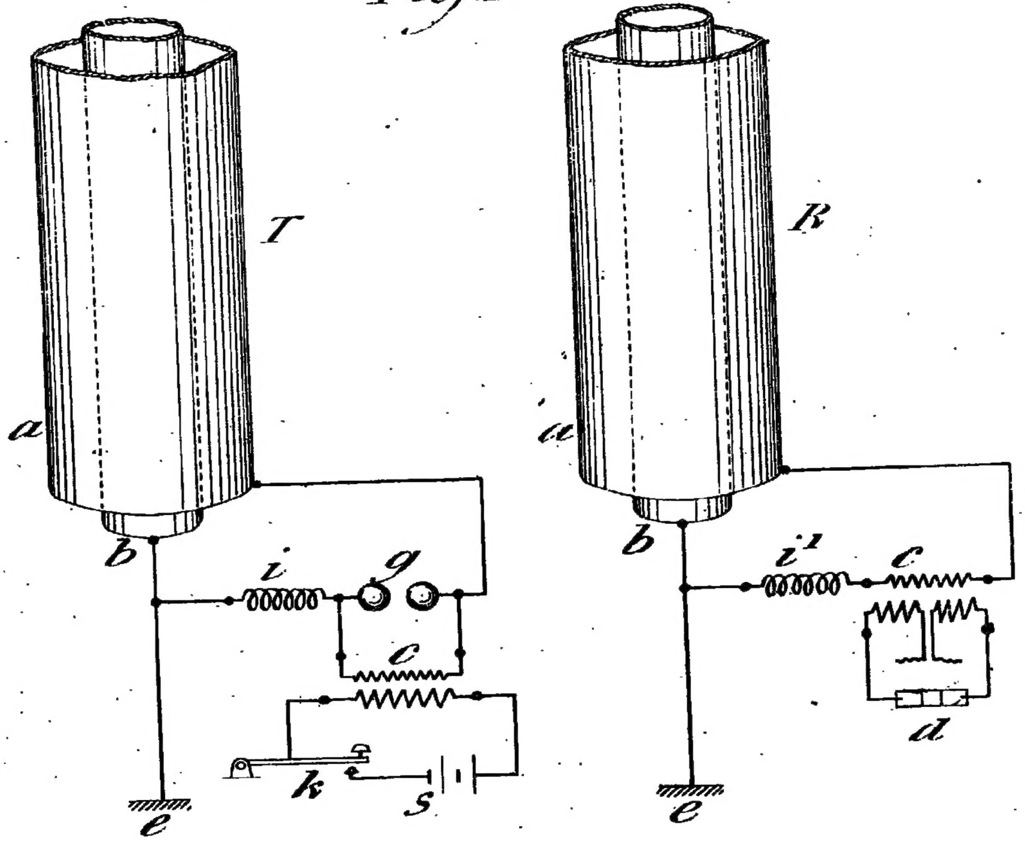
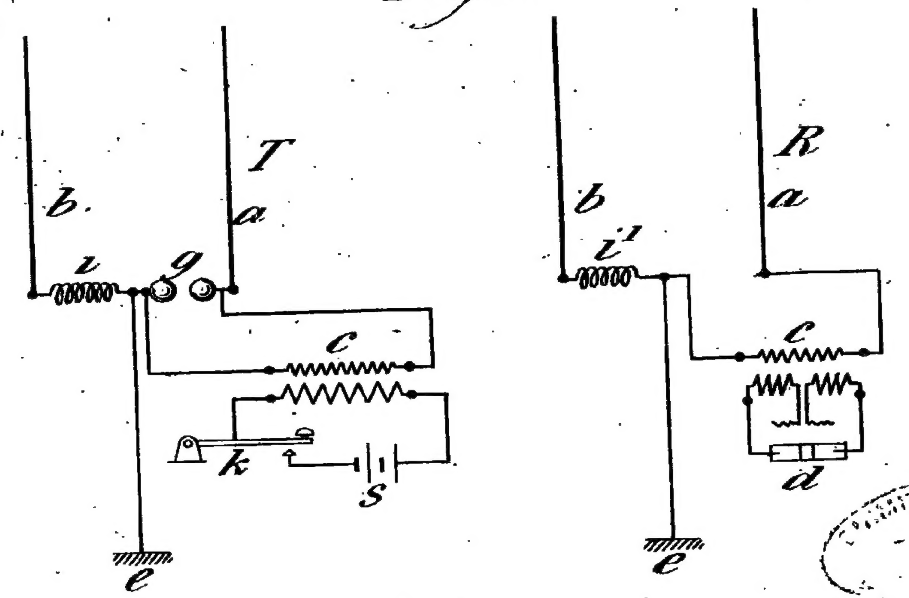


Fig. 2.



[This Drawing is a reproduction of the Original on a reduced scale.]

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